

The Word

A look at terms used in home inspection reports

Siding ABCs

Part 4: What is Stucco?

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ONCE AGAIN, THE WORD INVITES YOU TO TRAVEL into the dark realm of subjects that are sometimes misunderstood by home inspectors. The Word hopes you will find this trip informative and maybe a little entertaining.

This month we continue our discussion of “siding ABCs.” The Word finds this topic interesting because we are required to describe the type of exterior wall covering and inspect it as well. It helps to know a little about some of the many different types of siding we might encounter. This month we devote the column to one wall covering, stucco. Stucco is a very complicated subject. This column presents an overview of some of stucco’s history and issues.

What is Stucco?

Stucco has been around since ancient times. It was applied directly to masonry and stone walls as a protective coating and for aesthetics. It was not often applied over wood-framed walls until very recently. Stucco was (and sometimes still is) made from lime, sand and water. Horsehair was often added as a reinforcing material that helped bind the material together and helped reduce cracking. Stucco is a simple system that has worked well for centuries.

Today, we may substitute fiberglass or wire mesh for horsehair, Portland cement for lime, and cement modified with color and acrylics for the finish coat. These changes improved the system. The problems began when people started messing with the system

in other ways and when they started applying it over wood-framed walls.

Stucco can be a difficult wall covering to describe in compliance with the ASHI Standard of Practice (SoP). Part of the difficulty comes from the fact that there are several different exterior wall covering systems that people call “stucco.” These systems have different characteristics and at least one of them (spoiler alert: EIFS) is not stucco.

Adding to the terminology confusion is the fact that the terms plaster and stucco are synonyms. Stucco is often called exterior plaster.

Let’s sort through this confusion. **Stucco is available in three systems: One-coat, Two-coat and Three-coat.** The International Residential Code prescriptive requirements are for the Three-coat exterior plaster (stucco) system. The other systems are proprietary wall covering systems and like other proprietary systems they must be installed according to manufacturer’s instructions.

There are some important differences between Three-coat stucco and the other systems. The other systems are applied over foam insulation and may use a lighter-weight lath. The other systems are less than half as thick as Three-coat stucco and are more easily damaged. Even with these differences, it’s reasonable to describe all three systems as stucco.

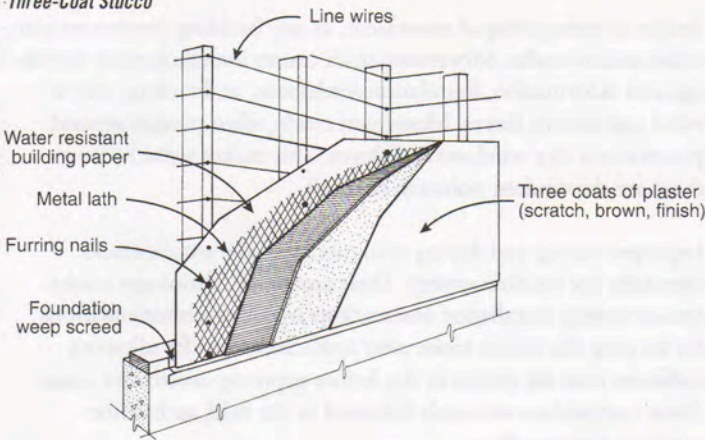
Then there’s the infamous Exterior Insulation Finish System (EIFS). EIFS shares little in common with stucco systems except the finished appearance. Since EIFS isn’t stucco, how should we describe it? We’ll discuss more about distinguishing between EIFS and stucco later.

Three-Coat Stucco

When applied over wood-framed walls, Three-coat stucco (also called hard coat stucco) consists of a scratch, brown and finish coat applied over a vapor-permeable, water-resistant barrier that is covered by corrosion-resistant lath. The scratch and brown coats should be about 3/8 inch thick and the finish coat should be about 1/8 inch thick. The total thickness should be about 7/8 inch. The water-resistant barrier and lath are not necessary when stucco is applied over masonry, and only two coats are required.

Thickness is one way to distinguish Three-coat stucco from other stucco systems. Try to find a chipped corner or some other area where you can see the stucco and lath. If the stucco is about 7/8 inch thick, and if you don't see (usually white) foam insulation board, it's probably Three-coat stucco. If you see foam insulation board or fine fibers in the stucco, it's probably Two-coat or One-coat stucco.

Three-Coat Stucco



Two-Coat Stucco

Two-coat stucco systems were developed in the Southwest in the 1970s. These systems merge the scratch and brown coats into one coat that is between 3/8 and 1/2 inch thick. A 1/8 inch thick colored finish coat is applied after the first coat has cured according to manufacturer's instructions.

Nominal Plaster Thickness for Two- and Three-Coat Work,^{1,2,3} in. (mm)

Base	Vertical				Horizontal			
	1st Coat	2nd Coat	3rd Coat ⁴	Total	1st Coat	2nd Coat	3rd Coat	Total
Interior and Exterior								
Three-coat work⁵								
Metal plaster base	3/8 (9.5)	3/8 (9.5)	1/8 (3)	7/8 (22)	1/4 (6)	1/4 (6)	1/8 (3)	5/8 (16)
Solid plaster base ^{6,7}								
Unit masonry	1/4 (6)	1/4 (6)	1/8 (3)	5/8 (16)	use two-coat work			
Cast-in-place or pre-cast concrete	1/4 (6)	1/4 (6)	1/8 (3)	5/8 (16)				3/8 (9.5) max.
Metal plaster base over solid base	1/2 (12.5)	1/4 (6)	1/8 (3)	7/8 (22)	1/2 (12.5)	1/4 (6)	1/8 (3)	7/8 (22)
Two-coat work⁸								
Solid plaster base								
Unit masonry ^{6,7}	3/8 (9.5)	1/8 (3)		1/2 (12.5)				3/8 (9.5) max.
Cast-in-place or pre-cast concrete	1/4 (6)	1/8 (3)		3/8 (9.5)				3/8 (9.5) max.

Installation of Two-coat systems begins with a vapor-permeable water-resistant barrier (WRB). Expanded polystyrene foam (EPS) is installed over the WRB and attached to the framing. Corrosion-resistant lath is installed, and the stucco is applied. The EPS is usually about 1 inch thick, but can be thicker depending on the desired insulation value.

One-Coat Stucco

Most systems advertised as One-coat systems are really Two-coat systems and are installed like Two-coat systems. In places like Phoenix and other desert areas, only one cement coat between 3/8 and 1/2 inch thick is usually applied. The finish "coat" is paint. Paint seems to work as the finish coat in a desert climate. Paint as a finish coat could be problematic in other climates for reasons discussed below. A final paint coat could violate manufacturer's instructions.

EIFS

EIFS was introduced in the US market in the late 1960s by Dryvit. It was originally intended as a wall covering for commercial buildings made from concrete masonry units (CMUs). It worked well in that application because the CMUs can deal with some water intrusion. Residential use began in the mid-1980s and gained wide acceptance in some markets as a way to comply with energy code requirements at a lower cost. The big difference was that EIFS was applied over wood-frame construction with no change in the process.

Since about 1996, the EIFS systems include a WRB made of building paper or equivalent materials. On top of the WRB, a layer of usually white EPS insulation board is fastened to the building and then covered with fiberglass mesh bedded in an acrylic modified cement base coat. This is then covered with a thin layer of textured acrylic finish. The total thickness for EIFS is about 1/8. EIFS is somewhat soft to the touch, yielding a bit under moderate thumb pressure. Sounds a little like One-coat stucco, doesn't it?

The problem with EIFS, as installed before about 1996, is that it was a water barrier system relying on almost perfect installation to keep water out. Any water that penetrated behind the EIFS had no

¹ Adapted from ASTM C 926.

² Where a fire rating is required, plaster thickness shall conform to the applicable building code or to an approved test assembly.

³ Exclusive of texture.

⁴ Additional coats shall be applied to meet finished thickness specified for solid plaster partitions.

⁵ For exposed aggregate finishes, the second (brown) coat shall become the "bedding" coat and shall be of sufficient thickness to receive and hold aggregate. The total thickness shown in the above table shall be achieved.

⁶ Dash or brush coat of plaster materials shall not be accepted as a required coat.

⁷ Where masonry and concrete surfaces vary in plane, plaster thickness required to produce level surfaces shall not be required to be uniform.

⁸ The above table shows only the first and finish coats for vertical surfaces and only the total thickness on horizontal surfaces for Two-coat work.

place to drain and no place to dry. Good installation is difficult, and perfect installation is nearly impossible. In addition to moisture infiltration from the outside, water vapor from the inside also had no place to dry. For these reasons, many EIFS houses from this era experience water infiltration problems of varying severity.

Modern EIFS is required to be a water-managed system that assumes some water will penetrate behind the wall covering. This water is given a way to drain. As such, modern EIFS can work, if properly installed.

Painting Stucco

Most stucco systems can be painted after waiting about 30 days for the stucco to cure. The finish coat in modern stucco systems is available in many colors, so painting isn't necessary.

Should stucco be painted? The "no" arguments are these. Paint is a vapor retarder that reduces the ability of the wall system to dry to the exterior. This can create mold and rot problems. Once you start down the (dark) paint path, forever will the stucco require repainting (sorry, Yoda). Other options exist such as fog coating, which is a spray-applied cement-based slurry, and thin coats, which are cement-based "paints." These options refresh the color without reducing the stucco's vapor permeability.

If one elects to paint, the paint should be formulated specifically for stucco. A high-quality elastomeric paint is best. Elastomeric paint has a better ability to bridge and seal minor stucco cracks.

Water Intrusion

In attorney heaven, an oxymoron if there ever was one, every home is clad with stucco. For the really good attorneys, the ultimate oxymoron, every home is clad with EIFS. They spend eternity winning water-intrusion damage claims. They have the same thing down below, except they lose every claim.

It's a safe bet to assume that moisture will enter wall systems, so it's wise to provide walls with a means to dry. Walls should, ideally, dry in both directions, toward the interior and the exterior. Drying to the interior is often reduced because walls are painted, are sometimes covered with wallpaper and often have vapor retarders installed under the interior wall covering. This is why the stucco water-resistant barrier shouldn't be a vapor retarder. The stucco system should "breathe" and allow water vapor to dry to the outside. Bad things happen to walls with nowhere to dry.

The barrier should be at least two layers of Grade D paper or an equivalent material lapped shingle-fashion to create an effective drainage plane. Two layers are an important part of the drainage plane because the stucco often adheres to the first layer, leaving no room for water to drain. Drainage occurs between the layers. By the way, Grade D paper is not the same as #15 building paper.

The barrier must be lapped over all flashing so that water drains over the flashing instead of behind it and into the wall. Lack of this critical detail, especially around windows and doors, is how the "good" attorneys often win their claims.

In newer construction, the equivalent material may be a house wrap specially made for stucco. These stucco wraps have grooves to help drain water between the stucco and the material.

Stucco Cracks

Cracking is one of the most common complaints about stucco. Stucco cracks for several reasons, including movement of the building and foundation, improper installation and lack of movement joints.

Stucco is unforgiving of movement, so any building movement can cause stucco cracks. Movement crack causes include lumber shrinkage and deformation, foundation settlement, and racking due to wind and seismic forces. Movement cracks often present around penetrations like windows and doors. This makes sense because these are the weakest points in the wall.

Improper curing and drying accounts for many stucco cracks, especially the hairline variety. These are mostly shrinkage cracks. Stucco system installation instructions include recommendations for keeping the stucco moist after application and for allowing sufficient time for stucco to dry before applying subsequent coats. These instructions are rarely followed in the field, so hairline cracking is common.

Stucco, like all concrete-type products, is prone to cracking, so installing joints to help control where the cracks occur is a good idea. Control and expansion joints are two different components. A control joint is a one-piece component, often with a curved visible profile. An expansion joint is a two-piece component, often with a square visible profile. The type of joint and its location are recommended by manufacturer's and by industry guidelines. Basic guidelines are as follows, but The Word rarely sees these installed in residential construction.

- Each stucco panel should be not more than 100 square feet in horizontal walls.
- No stucco panel should have a length more than 18 feet.
- The panel length-to-width ratio should be not more than 2½ to 1.

Reporting stucco cracks is as difficult as reporting cracks in concrete and masonry. There are no universally accepted guidelines, but here's what appears to be a consensus opinion. Stucco cracks less than 1/16 inch wide are no big deal. Report them if they are widespread and recommend monitoring. Report cracks more than

1/16 inch wide (about the width of a dime) and recommend evaluation for possible repair. These cracks can admit water, especially if they occur at wall penetrations. Cracks 1/8 inch wide and larger may indicate a more serious problem, especially if they also present out-of-plane displacement. Report them and recommend evaluation and repair as recommended by the evaluator.

Efflorescence

Efflorescence is the white powder that often plagues masonry and concrete. The powder is the residue from minerals leached from the stucco when water in the stucco migrates to the surface and evaporates.

Whether efflorescence on stucco is a significant problem depends on the water's origin. Unpainted stucco absorbs water. If the water comes from normal wetting of the stucco by rain, then there's not much to be done to stop the efflorescence from recurring. If the water comes through the stucco from behind or is wicking up the stucco from below, then the source of the water should be identified and eliminated.

The problem for inspectors is determining the water's origin. Fortunately, that's not our job. You should report efflorescence and recommend evaluation to determine the water source and repair, if any. Sometimes the repair is cleaning, repeatedly.

Inspecting Stucco

The problem for home inspectors when inspecting stucco is that critical details are concealed. That's why home inspectors should do several things when inspecting stucco homes in addition to looking for cracks and efflorescence. One is to note all potential water intrusion points during your exterior inspection. Windows and doors are the obvious points, but don't overlook electrical panels, pipe penetrations and roof/wall intersections. Very carefully inspect these points, both inside and outside, for evidence of water intrusion. Inspecting for weep screed is important because without it water has no place to drain. Weep screed should be at least 4 inches above earth, at least 2 inches above hard surfaces like driveways and at least 2 inches above roof coverings. Inspecting for the presence of control and expansion joints is a good idea. These joints are frequently omitted.

You should set client expectations about stucco inspections. Explain in your report that water intrusion can be concealed and that it may exist and not appear until long after the inspection. Recommending a full inspection by a stucco expert who has moisture detection equipment might be prudent for all stucco, not just EIFS.



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Describing Stucco

We had an informal discussion in the Standards Committee a few months ago about whether our SoP requires identifying EIFS. As usual, opinions were almost evenly split. Some members believe that inspectors should identify EIFS because EIFS isn't stucco and because of the concerns surrounding EIFS. Some members, including The Word, agreed that inspectors should identify EIFS, but that identification is not required because inspections are visual and because it's not always possible to distinguish EIFS from stucco. The usual tap test isn't always accurate, and more definitive tests could be considered technically exhaustive and thus out-of-scope.

The following is The Word's opinion. It is not an interpretation of the ASHI SoP. You should identify the specific stucco system or EIFS if you can. It's acceptable to describe stucco systems (Three-coat, Two-coat, One-coat) as stucco if you can't identify the specific system. You should report that you believe the wall covering may be EIFS if you're not sure and recommend evaluation to determine the wall covering system type.

The Bottom Line

We could easily fill this entire issue of *The Reporter* on the subject of stucco and EIFS. We've touched on the high points that most inspectors can use when inspecting stucco. You may want to get more training if you're in a market with a lot of EIFS homes because of the problems and concerns with these homes.

Memo to Hestia (goddess of the home and hearth): The Word does not reside on Mt. Olympus (just at its base) and welcomes other viewpoints. Send your lightning bolts or emails to Bruce@DreamHomeConsultants.com. The thoughts contained herein are those of The Word; they are not ASHI standards or policies. ■



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